Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	}	
	}	
Revision of Part 15 of the Commission's	}	
Rules Regarding Ultra-Wideband	}	ET Docket No. 98-153
Transmission Systems	}	

PETITION FOR RECONSIDERATION (REPLY COMMENTS)

Filed by: Multispectral Solutions, Inc.
20300 Century Boulevard
Germantown, MD 20874
(301) 528-1745

Date: 29 July 2002

In recent technical discussions[1,2], the Office of Engineering and Technology pointed out that the rationale and measurement techniques for pulse desensitization correction (PDC) are contained in Hewlett Packard (HP) Application Note 150-2.[3] This was further indicated as the basis for applying PDC to pulse waveforms under 47 CFR Part 15.35 of the Commission's rules.

HP Application Note 150-2 does indeed address the rationale for applying PDC to correctly measure total (i.e., full bandwidth) peak power using a spectrum analyzer. However, the rationale for applying PDC has nothing whatsoever to do with determining

---

[1] Telephone conversation between Mr. John Reed, FCC OET and Dr. Edward Richley, MSSI, 15 May 2002.

[2] *Ex parte* Meeting with Mr. Ed Thomas, et al. (FCC OET) and Dr. Robert Fontana and Mr. Robert Mulloy, 18 July 2002.

[3] "Spectrum Analysis … Pulsed RF", Hewlett Packard Spectrum Analyzer Series, Application Note 150-2, November 1971.

the potential for interference from pulsed devices. Rather, as pointed out in the HP application note regarding the topic of pulse desensitization,

> *"Pulsing a CW carrier results in its power being distributed over a number of spectral components (carrier and sidebands). Each of these spectral components then contains only a fraction of the total power."*[4]

Indeed, the application note acknowledges that "pulsing a CW carrier", or equivalently generating a bandpass pulse response, results in "only a fraction of the total power" being present in the measurement (or, equivalently, victim receiver) bandwidth.

Hence, the only point the HP application note is making is that full bandwidth peak power, a measurement required by radar system designers to determine potential system performance, is not always equal to the power as measured in any given spectral slice. However, it is precisely this "fraction of the total power" that causes interference. That is, it is the *power spectral density* (Watts per Hz or MHz) that determines the potential to interfere.[5]

Thus, HP Application Note 150-2, as well as the record in 47 CFR Part 15.35[5], strongly support the fact that PDC (except as expressly stated for frequencies below 1 GHz) is not required for measurements made above 1 GHz. As pointed out in MSSI's recent Petition for Reconsideration[5], the acceptance of this fact (namely, that PDC is not required above 1 GHz) permits the rationalization that the new limits for Ultra Wideband (Part 15.501)

---

[4] HP Application Note 150-2, pages 6-7.

[5] Petition for Reconsideration, ET Docket 98-153, Multispectral Solutions, Inc., 14 June 2002 (amended 18 June 2002).

are indeed more conservative that previously existing Part 15, rather than many orders of magnitude larger.

To further clarify the problem, consider the following three signal examples:

(a) A pulsed signal having a 2 GHz instantaneous bandwidth with a +32 dBm full bandwidth peak power operating in the 3.1 to 10.6 GHz band;

(b) A CW carrier having a -41.25 dBm peak power operating in the 15.205 non-restricted bands; and,

(c) A 4 nanosecond pulse having a 0 dBm full bandwidth peak power operating in the 15.205 non-restricted bands.

Example (a) is legal under the new UWB rules (§15.501). It has a peak power spectral density of 0 dBm/50 MHz or -34 dBm/MHz. (Assume the pulse rate is low enough to satisfy the average power requirement.)

Example (b) is legal under previous Part 15 rules with a peak and average power spectral density of -41.25 dBm/MHz.

Example (c) is illegal under both §15.501 *and* previous Part 15 rules (as recently interpreted by OET). Its measured peak power spectral density, however, is only -44.4 dBm/MHz.

Thus, while illegal, Example (c) has the lowest power spectral density! Interestingly, if one now ADDS the signal of Example (a) to the signal of Example (c), it suddenly

becomes legal! In other words, simply adding 2 GHz of broadband noise to a less interfering, but illegal signal, makes the new signal legal.

Conclusion

In summary, pulse desensitization correction (PDC) was used by Hewlett Packard (and radar) engineers to determine the true, full bandwidth peak power from measurements made with a modern spectrum analyzer (HP Application Note 150-2). It allows the engineer to determine total peak power from measurements of the power spectral density (i.e., Watts per Hertz bandwidth) in a given resolution bandwidth. From an interference perspective, however, full bandwidth peak power is irrelevant, as it is only the energy (power) received within the victim receiver's bandwidth that causes interference. This, of course, is precisely what the spectrum analyzer measures without the need for PDC.

In its Petition for Reconsideration, and in a subsequent *ex parte* presentation, MSSI pointed out the serious inconsistency between requiring the application of PDC above 1 GHz and the new UWB regulations. An additional example of the problems which this interpretation causes was provided above. Specifically, adding many hundreds of MHz worth of noise to a signal which happens to fail Part 15 on account of pulse desensitization correction, now makes the signal legal, and it can *now even operate in previously restricted bands!*

The solution to this dilemma is obvious and consistent with the vast record in this proceeding and in the deliberations leading up to the introduction of §15.35. Thus, the FCC should remove the requirement for pulse desensitization correction for

measurements made above 1 GHz. Note that, in doing so, the peak power density will still remain limited to 20 dB above the maximum average power density.